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AUGUST, 1929.

In Memoriam.

MAJOR-GENERAL SIR FREDERICK SMITH, K.C.M.G., C.B., F.R.C.V.S.

BY the death of Sir Frederick Smith the British veterinary profession has lost its greatest historian and one of its most earnest workers.

To write down all that we owe, directly and indirectly, to his individual effort would fill a very large volume, but the solid foundation upon which the Royal Army Veterinary Corps is now established will always remain as a monument to his memory, for Major Fred. Smith was one of those who were most prominent in its formation as a separate Departmental unit.

To every student in the various British Veterinary Colleges who has reached his second year, Smith's Physiology is an essential text-book, and authoritative articles from his pen have for many years covered a wide range of clinical subjects in each of the veterinary periodicals; and when he could be persuaded to lecture or demonstrate before any of the Veterinary Associations those who were responsible could always be assured of an appreciative and attentive gathering. His name is so well-known to Veterinary Science in every country of the world that no more Editorial note is necessary.

At the funeral service, held on Wednesday the 31st of July, at Golders Green Crematorium, there was, by his own request, no religious ceremony; but as the mourners and friends assembled the organist played Sir Frederick's favourite pieces—"The Moonlight Sonata," Part 1, "The Largo"; "The Flowers of the Forest"; "Mary

of Argyll " ; and—as the coffin (which was covered with the Union Jack and had placed on it the General's cocked hat and sword, with decorations, resting on a cushion) entered the chapel—the Regimental March of the 12th Royal Lancers.

The chief mourners were Lady Smith, Mrs. Symonds, and Dr. and Mrs. Poyser. Others assembled to pay their last respects included : Major-General H. T. Sawyer (Director General of the Royal Army Veterinary Corps), Major-General Sir John Moore (representing the National Veterinary Association), Lieut.-Colonels Mosley, Pallin and Argyle, Majors Glynn Lloyd and Rees Mogg, Sir John McFadyean, Principal Hobday, Professors Wooldridge and Hare, and Mr. Henry Gray.

By the special request of the General, when on his deathbed, Dr. Fred Bullock, the Registrar and Secretary of the Royal College of Veterinary Surgeons, conducted the final ceremony ; as the music ceased he rose and said :—

" The task I now undertake is not of my seeking. It is at the special request of my friend Sir Frederick Smith that I am to say a few words to those friends of his who should assemble here to-day to pay their last tribute to his memory. It is at his request too that there is to-day no religious ceremony of any kind. It was, I think, because he had a supersensitive apprehension lest anything savouring of insincerity should attach to this ceremony ; for a man who was always so self-contained and self-controlled, who had so great a love for the beautiful and the true, and above all, a man of such spartan self-discipline, cannot be said to have been irreligious. The music we have enjoyed was chosen by himself for the reason that he loved its beauty. He was moreover, though self-taught, an artist of no mean merit. If he saw a picture that he liked, he felt impelled to make it his own by copying it ; and his brush, like his pen, was seldom idle.

" But his great merit was his devotion to the advancement of his profession, and in that respect it might well be said of him : ' The zeal of his profession hath eaten him up.' He was always an enthusiast ; from his student days to the end of his long professional life he continually spurred himself on to new tasks ; his interest and zeal never flagged. Even on his death-bed he continued to write, and the finishing touches to his last article, a contribution to the new Journal of the R.A.V.C., were made by the palsied and trembling hand of a dying man. Every ounce of his energies, every day of his life, every thought, every aspiration, were devoted to his beloved profession ; to broadening, and deepening, and strengthening, the foundations, and doing his share towards building up the edifice of veterinary science. This he did often under the most adverse circumstances, in face of difficulties that would have effectually daunted a lesser man.

" This is not the occasion, nor am I the person, to appraise his merits as a student, as a researcher, as a teacher, or as a historian, but I make bold to say that when the story of his life is told (as I trust someday it will be told) it will be found that in the roll of men who have by devotion to duty, by sterling character, by sacrifice of personal ease, by continuous labour and

study, contributed to the general stock of knowledge in this particular branch of science, the name of Major-General Sir Frederick Smith will stand in the front rank.

" It was given to me in recent years to know him more and more intimately, and he will always remain to me, with his gracious charm of manner, as the personification of all that is meant by ' an English gentleman.' He belonged to no sect, and gave credence to no creed so far as I am informed ; yet—if a high ideal of honour, a scrupulous regard for truth, a deep devotion to duty, an unwearied and altruistic pursuit of knowledge; if a generous thoughtfulness for others, courage to pursue and overcome in face of manifold difficulties ;—if these are characteristics which are to be admired in a man—then General Sir Frederick Smith's character must command our unstinted admiration.

" But it would not be his desire to seek from us any such attitude to his memory. What he would crave for, if I may so far venture to express his desire, would be your understanding and friendly appreciation of the value of his work, during more than half a century, for his profession. And that desire is not unreasonable. Like all other human institutions, the veterinary profession is the sum not only of what its present members are and achieve, but of the lives and works of those of the past : and not only so—in the same way as the tree and its fruit are one, and interdependent, so a profession, which is alive and growing, is made up of, and includes, not only its past and its present, but in a very true sense its future also. The life of a worker like Sir Frederick Smith, which has become part of his profession, and has helped to make it what it is, is also making it what it is to become. There is no death for him in that respect.

" Among the vast mass of papers he left behind him, I found the following, written during the present summer :

" ' I do not know how long I shall last, but I do know that I have had such a miserable time during the last two months—daily losing ground, with a diminished daily output of work—that I shall be very pleased to set my face towards the west, and tramp out into the unknown.' He died as we have said, still working. He died with the supreme consolation to him that the tasks he had set himself were well and truly done, and that others would benefit from his labours.

" He was in touch with most English-speaking veterinary surgeons of note throughout the world not only of his own generation, but especially among the younger members of his profession. He learned from them and they from him. He was especially kind in his encouragement of young men and he received the greatest respect from men of his own age. In a letter received the day of his death from Dr. Fish, the Director of the New York State Veterinary College, there is a passage which I think I may very properly read to-day. Dr. Fish, after thanking Sir Frederick for valuable advice and assistance, says : ' It is difficult to close this letter, since it may be the last one you may be able to receive from me. I am thankful for the contact we have had in our correspondence, and regret more than I can say that it must necessarily terminate. I, more than others of the profession, am grateful for the example and inspiration of your life's work. Your memory will not fade. The veterinary profession is a better profession because you have been included in it. All will grant that no individual member has done more than you to raise the standard ; and now, as the campaign closes, all I can say is—Goodbye and Farewell ! '

" And so he signs himself ' Your devoted friend, P. A. Fish.'

" These words from across the seas have, I am sure, found an echo in the heart of everyone present. They are words which express what many other correspondents of his have written ; they are words which our friend would have been glad to hear."

Turning at this point to the bier Dr. Bullock concluded as follows :

" Now we obey his last behest.

" Now we commit, at his request, his body to the flames. We bid good-bye to the shell which housed his ardent spirit. But the profession which he loved, with which he identified himself, will, as long as it lasts, bear the impress of his life and work and character ; and we who knew him, and loved him, will ever cherish with gratitude the memory of all that was best in him."

While these sentences were being pronounced the coffin slowly disappeared through the gateway to the incinerarium, and the organ took up the strains of the Dead March in Saul.

After the ceremony was completed the ashes were brought to the Royal Veterinary College for disposal in accordance with the dying wishes of the General, who wrote on the 15th of July : " The Governors will be asked in due course to let my ashes lie in an ordinary jar in the Museum. I should like to think that I am not to be separated from the work I have loved so well."

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General Articles

VETERINARY EDUCATION WITH PARTICULAR REFERENCE TO STATE SERVICES IN THE TROPICS.

By R. DAUBNEY,
Assistant Chief Veterinary Research Officer, and
R. W. M. METTAM,
Veterinary Research Officer, Kenya Colony.

(Paper presented at the Pan-African Conference, Pretoria, Aug., 1929.)

There is little doubt that in the past the authorities in control of veterinary education have not devoted to tropical veterinary science that special attention to which its importance, as a sphere of professional activity, most certainly entitles it. Some years ago it was possible to obtain, in at least two of the educational institutes in England, short post-graduate courses in Tropical Veterinary Science and in State Veterinary Medicine, which combined a fairly extensive amount of practical laboratory work with lectures in the special subjects. These courses—in particular the one held by Sir John McFadyean at the London College—were well attended by members of the colonial services, the home municipal services, army officers, and by candidates for such posts. At the same time, however, the fees charged were inadequate to cover the cost of the instruction given—at least at the London College—and during the period of post-war disorganization it was found necessary to abandon them on the score of expense. Numerous government commissions have, in the last few years, repeatedly drawn attention to the need for improvements in the training available to veterinarians entering the services of the colonies, and the recent * Lovat Committee on veterinary services has further stressed the urgency of such measures, and the necessity for the provision of refresher courses for colonial veterinary officers, who will be given study leave in order to attend.

It is of importance to decide in what respects the present professional equipment of the veterinarian destined for the colonial service is deficient, and in what manner the necessary improvements can best be effected. Is it possible to effect the necessary improvement solely by means of short periods of intensive post-graduate training, or is it not possible, also, that the time has arrived to review the present curriculum

* Colonial Veterinary Service, Report of a Committee appointed by the Secretary of State for the Colonies. London, January, 1929.

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of the graduate course, and to change its orientation towards what is now becoming the most important side of veterinary activities? One of us has recently advocated the remodelling of the present graduate curriculum, with the object of effecting improvements in general training, in order to equip graduates for the State Services. The alterations suggested are chiefly concerned with the provision of a more adequate training in laboratory work both in veterinary and pre-veterinary subjects. The difficulties with regard to fitting in additional laboratory work in veterinary subjects during the present four-year course, and the added difficulty of increasing the amount of practical work in pre-veterinary subjects, is thoroughly appreciated, and was discussed at length in the article already referred to. Scientific knowledge is advancing so rapidly that it is becoming increasingly difficult, in the comparatively short period of a student's life allotted to professional education, to equip him with an all-round training in such a large group of general scientific and special subjects as is required from the modern veterinarian or medical man. There is no doubt that an identical problem has much exercised the minds of those in control of medical education, both in Great Britain and in the United States of America, and in a few instances a serious and, in our opinion, a successful effort has been made to effect the necessary changes without increasing the curriculum to the unwieldy length of medical courses in some of the Southern European States. Indeed, the method adopted by these medical schools in England, notably of the Cambridge and Liverpool Universities, appears to the writers, after a consideration of all possible alternatives, as the only solution of our present difficulties. The necessary expansion in pre-medical work has been effected by raising the standard of the entrance examination, and by confining the teaching in the medical course to advanced instruction and practical work in these subjects. Thus the candidate is required to pass examinations corresponding to the first parts of M.B., physics and chemistry before registration. Further, although it has been possible in this way to combine some slight economy of time with improved instruction in pre-medical subjects, it has been found necessary, in order to permit of the full expansion of the actual medical training, to institute a short fourth term, which is held at the commencement of the long vacation. In America similar results have been achieved by increasing the preliminary high-school or university requirements for admission to the best medical schools, and by increasing the number of hours per day required of the student during the terms; which, incidentally, are somewhat longer than those of English Universities.

It is certain that any professional committee, appointed to review problems connected with veterinary education, will be faced with the

necessity of recommending some means of effecting similar changes in the veterinary curriculum; and, although the benefits of well-organized post-graduate training are undoubted, it is the conviction of the present writers that not until these advances have been made can students reap the full advantage from these short periods of intensive post-graduate training.

The question at once arises as to whether these recommendations are practicable in view of certain existing handicaps to veterinary colleges, such as the possible intimidation of intending candidates by a more exacting standard of preliminary educational requirements, and the difficulty of setting up a really sound organization for the adequate teaching of pre-veterinary subjects in institutes already financially embarrassed. The whole problem has already been discussed by one of us, and a solution has been offered in the shape of a suggestion that teaching up to the last two years should be handed over to an existing university, preferably one which has modernised its medical teaching. Cambridge University was cited as the most suitable institution, and the present course for the pathological tripos as an ideal curriculum for the earlier years; the veterinary college would then become a finals school teaching special pathology, bacteriology, protozoology, and related subjects, together with clinical medicine and surgery in the two final years. In order to bring the training in these subjects up to the required standard, it will no doubt be necessary to work the student harder, and to compel him to sacrifice part of his long vacation to a fourth term. The institution of these changes would not only effect considerable economy, and allow of greater expenditure upon the important teaching of the final two years, so that here a really efficient organization could be maintained, but would also ensure the recruitment of candidates of the highest mental calibre. It is our conviction, and that of university teachers in medical schools with whom the question has been discussed, that there would be no shortage of suitable candidates. Students would regularly be diverted to the veterinary profession from two sources—from the natural science tripos group, and from the pathology tripos—and there can be no doubt that one of our problems in the past has been to attract a sufficiency of candidates of this class to fill posts, more particularly on the research side. The findings of the committee on colonial veterinary services are in complete agreement with the suggestions advanced in this and previous papers. With regard to the question of raising the standard of preliminary educational requirements and including in them preliminary training in the pre-veterinary sciences, the report states that " Many witnesses emphasised that, in order to avoid the cramming in pure science which is usually

necessary during the undergraduates' first year at a veterinary school, there should be a pre-registration course in science which would lengthen the syllabus by one year." In considering the question of recruitment and training, a recommendation is made that holders of a degree in pure science, or the equivalent of part one of the Cambridge natural sciences tripos, should be encouraged to enter the colonial veterinary services; and practical assistance is here offered by the provision of educational scholarships. It is evident, then, that the committee was impressed by the same deficiencies in the present curriculum which impelled one of us (Daubney*) to offer the suggestions for reorganization included in previous articles and briefly referred to in this paper.

Granted that the improvements in the graduate curriculum already suggested are made, there still remains the problem of equipping the graduate for special work in the tropics. As the Lovat Committee has pointed out, there is at present no provision for post-graduate courses in tropical veterinary science in this country, while, on the other hand, in the colonial medical service the importance of post-graduate study in tropical medicine is recognised, and an officer's final selection for appointment is dependent upon a satisfactory report on his progress during the special course of instruction at one of the recognised schools of tropical medicine. Attendance at a four-months' course is compulsory for French veterinarians desirous of working in the French colonies and protectorates. May we quote paragraphs 43 and 44 of the report of the committee on colonial veterinary service? "At present the newly-appointed Colonial Veterinary Officer arrives in a British Colony with an inadequate knowledge of animal diseases peculiar to the tropics, and their treatment and prevention. We fail to see how he can be of any real practical value to his Service until he has had some specific instruction in those animal diseases which are to be met with in the Colonies. We feel strongly that without such instruction he is handicapped from the commencement of his career, and that unless he has a keen scientific interest he runs the risk of never properly mastering the first principles of tropical veterinary science. In our opinion a newly appointed officer should not assume his normal duties in the field until he has familiarized himself with his future work by means of the following supplementary training:—

1. (a) Comprehensive courses in protozoology, entomology, and helminthology.

* 1927, "Veterinary Research in the Colonies." *Veterinary Journal*, London, LXXXIII. pp. 534-547.

1928, "Veterinary Education." *Ibid.* LXXXIV. pp. 325-332.

(b) More advanced work in pathology, bacteriology, and bio-chemistry.

(c) Courses in animal nutrition, animal genetics, tropical hygiene, and tropical agriculture.

(d) The application of these sciences to specific problems of animal disease and epizootiology.

2. Training, chiefly practical, at a laboratory in which tropical diseases of animals can be seen under circumstances approximating more nearly to normal conditions.

" The special courses referred to under (1) could most easily and economically be arranged in Great Britain. But the second and practical portion of the training could be satisfactorily given only in a tropical country. It would be of undoubted advantage if all newly-appointed officers could receive clinical instruction at some well-equipped centre abroad, in order to complete their initial training before assuming their normal duties. We fear that this is impossible, in view of the vast extent of the Colonial Empire. We recommend, however, that if the Colony to which an officer is posted has a veterinary laboratory he should receive a course of instruction of about three months' duration before proceeding to his up-country station. Where no veterinary laboratory exists, he should if possible be sent for such training to a neighbouring Colony possessing the necessary facilities." In our opinion they summarize the situation as it is to-day, and offer solution of difficulties in the future.

We may take it as fairly certain that the recommendation of this Committee as to the creation of a post-graduate School of Tropical Veterinary Science, probably in London, will be given effect at an early date, and it remains briefly to consider the functions of such an Institute and various possibilities as to its exact organization. In the first place one must not lose sight of the fact that there are two classes of colonial worker for which it is desired to cater—the research worker and the field officer. The pure teaching of the school will necessarily be concerned with equipping the field officer on first appointment, and with providing refresher courses for the field officer on leave, and we propose to deal with this side of the school's activities first.

The chief course of instruction at the school then will be a five or six months' course terminating either in a special examination or in a specially arranged post-graduate examination of the Royal College of Veterinary Surgeons, such as a D.V.S.M., in tropical medicine. There might be a stipulation by the Colonial Office that if an officer appointed cannot take the course and the examination before first proceeding to duty, he should take it during his first home leave. The refresher

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course for more senior field officers will cover much the same ground as the course for juniors, but will be mainly concerned with bringing up to date the officer's knowledge of special tropical diseases, and acquainting him generally with the material progress made by research in recent years. Such a course would assist the field officer to collate the results of his tropical experience, and to choose subjects suitable for a thesis for the higher university degrees, or the F.R.C.V.S. The two courses will cover the same ground, and it is necessary only to indicate the scope of the various divisions.

The following sections are tentatively proposed :—

Bacteriology.—The special bacteriology of tropical diseases such as the hemorrhagic septicæmias, *Salmonella* infections, *Actinomyces* and other *Streptothrix* infections, contagious pleuro-pneumonia of bovines, the contagious pneumonias of sheep and goats and epizootic lymphangitis. Special features of certain bacterial diseases in tropical countries, *e.g.* anthrax, blackquarter and related anærobic infections, contagious abortion, ulcerative lymphangitis. Practical laboratory work in the bacteriology of these diseases.

Protozoology.—The intestinal protozoa of domesticated animals. The blood-borne protozoal infections—Hæmosporidea, Flagellata. The spirochæte and *Spironema* infections.

Helminthology.—Parasitic worms in tropical countries. Parasites peculiar to the tropics. The economic importance of the different species, their life histories, the control of infestations under tropical conditions, and methods of anthelminthic treatment.

Entomology.—The insect and arthropod vectors of disease. Life history, distribution, and control. The parasitic insects and arthropods.

The Filtrable Viruses.—The etiology of such diseases as the pox group, rinderpest and fowl plague, contagious ecthyma of sheep, contagious papillomatous stomalitis of sheep, contagious pleuro-pneumonia of goats, rabies, foot and mouth disease, swine fever (tropical form), horse-sickness, blue-tongue, and infectious anæmia of horses.

Rickettsia Diseases.—Heartwater.

Epizootiology.—A course of lectures on this subject, and its general and special application in the control or eradication of diseases of economic importance.

Plant Poisoning.—The recognition of the commoner poisonous plants, their distribution, the symptoms produced by feeding ; etiology of certain diseases that are known to be caused by the ingestion of poisonous plants.

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Nutrition.—The pathologic conditions associated with vitamin or mineral deficiencies, experimental data. The distribution of deficiency diseases. The common food grasses and grains. Principles of animal feeding.

Genetics.—Genetics of domestic animals. Value of genetics in improving breeds, heredity, inherited resistance to disease. Sterility, diseases of the reproductive system.

Throughout the course insistence will be laid upon practical laboratory work, with the object of enabling men to deal with problems in the field in a systematic fashion. May we be permitted to reiterate that one important result of this type of training will be the amount of hitherto neglected material that will then reach the research worker?

It will be evident that to carry out the suggested programme with thoroughness, a large and expensive staff will be required unless, in addition to the whole-time staff, the services of specialists can be obtained as visiting staff. The Institute, therefore, must be located in a centre where the services of such visiting staff will be available. In the circumstances, either Cambridge or London is indicated as the most suitable site for the Institute. Consideration has been given to the possibility of adapting one of the existing Colonial Research Institutes to the purpose, and in particular Onderstepoort, with its teaching organization, was considered, but there are overwhelming advantages to be gained by placing the school in Great Britain. There the school would be more or less central. Officers on leave would benefit by the change to a healthy temperate climate. The specialist visiting staff, which would be available, could not be found within easy reach of any institute in the colonies. The course given would lead to a degree or diploma of either Cambridge or London Universities, which would be accorded world-wide recognition; while senior officers and research workers would be able, under the teaching of the school, to proceed to a senior degree of those Universities at which they were educated.

The permanent staff of the institute will, no doubt, be selected from men experienced in tropical veterinary research, and it is the conviction of the writers that it will be necessary for the staff to continue active research work in order that the standard of their teaching shall not suffer. Original research maintains the teacher in close touch with current progress in all sections of the subject he is teaching, in addition to stimulating in him an enthusiasm and keenness which is inevitably reflected in the quality of instruction imparted to his students. It is well known to people in touch with scientific education and perhaps, particularly so, to those whose concern has been veterinary education,

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that failure to provide facilities for original research in schools leads rapidly to a marked deterioration in the quality of the teaching. There is a wealth of material of fundamental importance to colonial veterinary science that can be investigated in an institute at home, and no doubt the permanent staff of the school will also be given facilities to visit the colonies and carry out investigations of disease problems *in loco*. The staff of such an institute is in a particularly favourable position to carry out fundamental or long-range research of the type that correlates problems in different colonies, and enables one to realise the essential similarity of problems which at first sight may have appeared more or less unrelated. The worker in such an institute acquires a perspective which is often lacking in the isolated worker in the colonies. Particularly favourable from the research worker's point of view will be the situation of the staff with regard to access to scientific literature, and the advantages of working in a recognised centre of scientific research are in this respect hardly to be overestimated. Intercourse with other scientific workers, and freedom to discuss collateral subjects with specialists in their particular spheres, is a privilege of the centralised worker that is not enjoyed by his colleague working in colonial institutes, which are generally understaffed. In centres such as London the pure biologist, the physiologist and the chemist, are available for consultation by the worker who in the course of his investigations is in need of information or expert advice upon any of these subjects.

Certain diseases are so widespread throughout the tropics, that the local investigator is faced with extreme difficulty in obtaining a supply of susceptible animals for experimental purposes. Even though he is able to obtain a limited number of animals supposed to be susceptible to the particular disease under investigation, he is constantly faced with the possibility that some of the supposedly susceptible animals have at some time contracted the particular disease in a mild form and acquired immunity. This possibility has always to be considered when interpreting the results of experiments carried out under such conditions. There is a further point that arises, particularly in connection with the insect-vected diseases such as the piroplasmoses, from which recovery is incomplete ; the same insect host may transmit two or more of these diseases, and the same definitive host may, although apparently healthy, be capable of infecting a tick with two or three species of parasites. Under these circumstances the difficulty of establishing pure-line infections for research work, either in the tick or in the vertebrate host, will readily be appreciated. The investigator outside the tropics has at his command large numbers of experimental animals that are known to be susceptible. Even the limited amount

of work upon East Coast Fever, and other related small piroplasms, already carried out by a few investigators in Europe, clearly indicates that research in such centres is essential if the life-histories of this group of parasites are to be worked out and thoroughly scrutinized. Sir Arnold Theiler is in complete agreement with this view and has given expression to a similar opinion on several occasions.

Workers in a central institute will be in a position to specialize and, apart from definite hours allocated to teaching duties, will be able to carry on research unembarrassed by routine duties such as diagnosis.

Laboratory workers in the colonies are frequently unable to carry investigations to a final solution, owing either to the difficulty of obtaining ready access to scientific literature or to the need for consultation with some other specialist whose services are not available. Research workers are usually anxious to complete investigations while they are on home leave, but they often experience difficulty in the choice of a centre for work, and in the selection of the right people to whom they should apply for advice and assistance. Accommodation would be available at the institute for workers on leave from the colonies, and the experience of the permanent staff and their knowledge of the facilities available in London and elsewhere should prove of the greatest value to the worker from abroad.

The Institute would normally function as the principal training centre for young research workers who would eventually be drafted into the Colonial Service, and it is proposed to institute scholarships with the object of attracting young men to the colonial veterinary services, particularly on the research side. The director of the institute should supervise the training of these scholars, and direct their efforts towards the solution of problems of economic importance to the colonies.

In the report of the Lovat Committee suggestions are made for the permanent staff, which includes a director and three senior officers, together with temporary and visiting staff. We are in general agreement with the recommendations made in those sections, 48 to 54 of this report. It has, however, occurred to us that in addition to the nucleus of permanent staff and the junior scholars undergoing training, both the affairs of the institute and of veterinary research in general would benefit if some provision could be made for the inclusion of a few more senior research workers. We refer here to men of the type that often receives Senior Beit Memorial Fellowships or special grants from scientific bodies. It is probable that one such Fellowship of the value of £700 per annum, will be provided by private subscription in Kenya, and there are reasons for hoping that each Fellowship, financed privately, will be the means of obtaining a similar grant from one of

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the bodies interested in tropical research. The proposal is, that these whole-time research fellows should devote their studies to the solution of a particular problem or to a group of related problems, working partly at the central institute and partly in the field, or in colonial laboratories where material for investigation is available.

Referring back now to our earlier consideration of the improvements that might be effected in the ordinary graduate course, it is quite evident that improvements in graduate training will be reflected in the capacity of graduates to benefit by intensive post-graduate courses, but at the present moment, one is more likely to achieve rapid results by the post-graduate method. The profession is invited to support whole-heartedly the recommendations of the Lovat Committee, and above all to remember that when the educational reforms suggested have been effected, it will still be necessary to press for the early adoption of the recommendations dealing with improvement in the prospects and conditions of service of the profession in the colonies. If the promises of that report with regard to improvement of the status of the service are not realised, it will be found that, in spite of improved educational facilities and of such inducements as scholarships, there will still be a shortage of suitable candidates of the right calibre.

SOME ATTEMPTS TO OBTAIN, BY MEANS OF PHYSIOLOGICAL EXPERIMENTS, AN OBJECTIVE BASIS FOR AN OPINION AS TO THE CRUELTY ALLEGED TO BE ATTENDANT ON THE JEWISH RITUAL METHOD OF SLAUGHTERING CATTLE.*

By PROFESSOR A. V. SAHLSTEDT,

Principal of the Veterinary Institute, Stockholm.

THE general interest attached to the ritual method of slaughtering cattle employed by the Jews (Schechita)—an account of its supposed cruelty—has led to lively discussions, where, on the one side physiological points of view were emphasised, and, on the other, laymen's supersensitive sympathy for animals became apparent. As, of course, the subjective reaction to pain on the part of animals has hitherto been and, probably, always will, remain hidden from our judgment, we have been obliged, in the discussions respecting various methods of

*Abstract from 3 Nordiske, Veterinaermote, Oslo, 11 Juli, 1928.

slaughtering cattle—as far as the question of protecting the animals from unnecessary cruelty was concerned—to investigate the testimony borne by our observation of certain physiological phenomena, the blood-pressure, the movements of the animals, etc. By these means, and by comparison with corresponding conditions in the case of human beings, endeavours have been made to draw deductions respecting the presence or absence of consciousness, i.e. the condition of conscious sensation of pain in the animals slaughtered. To be able to contribute to such objectively determinable facts as might serve as guides to our judgment in such cases, the writer has carried out certain experiments on cows in connection with the Jewish methods of slaughtering. These experiments form a part of the investigation made by the professors of the Veterinary Institute in Stockholm, as the result of a proposal for a Slaughtering Bill which was placed before the Swedish Parliament in 1925.

1. By measuring the area of the vessels which convey blood to the brain, it has been found that the amount of blood, which is normally carried to the brain by the vertebral arteries, amounts to from 1/5 to 1/6 of the total blood supply to that organ.

2. By experiments with a " Stromuhr " placed in one of the vertebral arteries, it has been found that the amount of blood passing through these arteries during the course of the first 20 seconds after the " schechita " cut has been made, falls to about $\frac{1}{6}$ of the amount which passed before, so that the total supply of blood to the brain should, in the same time, fall to 1/30-1/40 of the normal amount.

3. By collecting and measuring the blood which escaped from the large vessels of the neck after the cut, at periods of half or one minute in duration, it has been found that the bleeding, under normal circumstances, is so rapid that, after half minute, 33 per cent.; after one minute, 50 per cent.; after $1\frac{1}{2}$ minutes, 63 per cent.; after two minutes, 70 per cent. · after three minutes, 83 per cent.; after four minutes, 90 per cent., and, after five minutes, 95 per cent. of the total amount of the blood which runs away, has been carried off.

4. A blood-pressure experiment, carried out with the venous blood in the sagittal sinus of a cow after the cut, gave a slow lowering down to 0, which lasted about $6\frac{1}{2}$ minutes. The seeming want of agreement between this experiment on one side, and on the other side the writer's bleeding experiments and test respecting the speed of the blood-current in the vertebral arteries, and some experiments respecting the arterial blood-pressure and the intracranial pressure,

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carried out by Lieben, may probably be explained as resulting from local vasomotor effects.

On comparing the results obtained by the writer's own tests and by Lieben's, the writer has arrived at the conclusion that, in normal procedure, the Jewish method of slaughtering is probably rapidly followed by loss of consciousness, and that, consequently, this method cannot be said to be attended by "cruelty" to the cattle. But, in consequence of the disposition of cows' blood to coagulate rapidly, there *can* ensue, after the cut (and that rather quickly), a closing of the large blood vessels of the neck; so that one ought to take into account the possibility that, during the first few minutes after the cut, the blood pressure may be maintained at such a level that the brain will still receive the amount of blood necessary for consciousness. If in a possible future Slaughtering Bill an exception be made in favour of the Jewish method, excusing those employing it from rendering cattle unconscious by means of shooting or striking the forehead before bleeding, then the writer considers it best, as a protective measure against needless suffering on the part of the cattle, that the regulation should be added to the Act that this latter operation must be carried out immediately *after* cutting, as a guarantee that the slaughtered cattle have, after all, been killed as painlessly as possible.

A FEW NOTES ON AN OUTBREAK OF ULCERATIVE CELLULITIS.

By T. A. COCKSEDGE, M.R.C.V.S.,

Chief Veterinary Officer, British Somaliland.

DURING this year the animals of the Stud Farm were unfortunately visited with a very bad outbreak of ulcerative cellulitis. The disease first occured in the month of April, and it was December before I was able to declare the outbreak over. During the same time it was reported to me that many native-owned animals in the western area and in Abyssinia were suffering from the same disease, called by the native "bissa." Immediately the first cases were seen they were of course isolated, swabs taken and on microscopical examination the bacillus Priesz-Nocard was demonstrated, also a gram-negative bacillus. On culture and plating out distinct colonies were isolated of these two organisms. The clinical aspect of the disease was very serious, as it seemed to be a very virulent type, and formation of matastatic abscesses was very frequent, death being caused in two cases from

abscesses in the lungs, and a third case forming a large abscess in the perineal region with a rectal fistula.

Treatment in most cases was very unsatisfactory and the percentage of mortality was very high. The only treatment found to be of any value was, in the first instance to open up and thoroughly scarify the ulcers and apply saline dressings, at the same time giving tonics and alteratives. A few cases yielded to this treatment. Towards the end of the outbreak I decided that any but the saline swab treatment was of very little value and as the saline-swabs meant a lot of individual attention—staff for which I had not got—I decided to try mass treatment. Not being far from the sea I arranged for the remaining animals to be immersed daily for two hours in the sea, and the rest of the twenty-four hours to be kept in swabs and bandages soaked in sea-water. The results were very satisfactory as all the cases immediately began to improve and only one case broke down again after apparent recovery, finally even this case made a complete recovery. I am quite aware that this is just a hit in the dark combined with empirical treatment, without any relation to the cause of the disease, but the next time I have the disease to deal with to the sea I am going. The method of spread and the initial infection in this outbreak was undoubtedly due to ticks, a grazing area the animals were taken to was very badly infested with ticks and though the ponies were de-ticked very thoroughly undoubtedly the small sores caused around the fetlocks and heels became infected.

AN EXAMINATION OF A NUMBER OF CASES OF OVINE MASTITIS.

By W. J LEYSHON, M.R.C.V.S.,
Veterinary Officer to The London County Council.

(*Concluded.*)

Discussion.

The examination of a number of cases of mastitis in ewes shows that the condition is associated with abundant growth of bacteria within the udder tissue. The changes produced appear to be consistent with the effects of such bacterial activity. Experimentally it has been found possible to reproduce the condition in normal lactating ewes by the injection into the teat canal of pure cultures of the organisms most frequently concerned, and it is therefore evident that such bacteria are capable of setting up mastitis when they obtain access to the udder in sufficient numbers. It must be assumed that under normal conditions

the defensive powers of the udder are sufficient to protect it against harmful effects of bacteria. Organisms are frequently present in the milk sinus and teat canal, but their multiplication is distinctly limited in the healthy gland. The factors predisposing to attacks of mastitis are still largely unknown, and it is also a matter of doubt whether the disease when it occurs is the result of a sudden multiplication of organisms normally present in the milk sinus or teat canal or is due to the introduction of other organisms. Possibly it may result in either of these ways. It has been suggested that wounds and abrasions of the teats may serve as the starting point of infection. These were present in some of the cases we have examined, but the majority of affected animals showed no macroscopic evidence of teat injury.

Many shepherds are agreed that sudden climatic changes, especially a cold easterly wind following a spell of warm weather, increase the incidence of the disease. Cases of mastitis are also not infrequent after weaning unless the ewes' udders are partially stripped once or twice within the first few days.

Summary.

1. Thirty-eight cases of mastitis in ewes have been investigated.
2. Various organisms appear to be associated with this condition.
3. A staphylococcus was by far the commonest organism found in these cases, being present in approximately 66% of those from which growth was obtained.
4. A description is given of the lesions present in natural cases and of the chief characters of the principal organisms concerned.
5. Experimentally it has been found possible to reproduce the condition in lactating ewes by injecting into the udder, by way of the teat canal, cultures of either staphylococci, streptococci or coliform bacilli isolated from natural cases.

Appendix.

Details of Cases.

Case No. 1. 11.5.25.—This animal was first seen by us when she had been ill for a few hours only. She appeared dull, with drooping ears, and was slightly lame in one hind limb. The visible mucous membranes were injected. Temperature 104.5°. The left half of the udder was considerably enlarged, hot, tense and painful. The subcutaneous tissues in the neighbourhood of the gland showed a diffuse œdematous swelling. The secretion of the affected half consisted of a thin yellowish fluid. Examination of centrifuged deposit showed the presence of a variety

of organisms—gram negative bacilli, streptococci and staphylococci. Cultures of these organisms were readily obtained on artificial media. The staphylococcus was of the albus variety. Blood cultures in which 10 c.c. of blood taken from the jugular vein was used as the inoculum showed no evidence of growth. Part of the affected half of the udder subsequently became gangrenous, and after a period of about five weeks, during which the ewe showed very marked loss of condition, it finally sloughed, leaving an extensive wound which slowly healed. As a result, the affected part became completely atrophied. The animal's blood was tested on 2.6.25 and again on 16.6.25 for the presence of agglutinins for the organisms isolated from the udder secretion. The result was negative.

The other half of the udder remained perfectly healthy, and the ewe recovered completely and reared a lamb the following season.

Case No. 2. 18.5.25.—First noticed to be ill on 16.5.25. When examined she appeared dull but was feeding a little. The left half of the udder was enlarged, hot, painful and slightly hardened. The secretion was a watery yellowish fluid containing whitish floccules.

A gram negative bacillus was obtained in pure culture. The animal recovered.

Case No. 3.—This animal was examined a few hours after she was first noticed to be ill. She was lying away from the remainder of the flock, and had a dejected appearance. Temperature 106° F. The left side of the udder was slightly swollen and tender. The secretion had the appearance of normal milk, but when centrifuged, showed excessive deposit which was rich in leucocytes, and contained numerous cocci. A pure culture of staphylococcus albus was obtained. She died on the fourth day.

Case No. 4.—In the early stages of the illness, the ewe appeared dull, but did not entirely lose her appetite. The affected half of the udder was painful, and the secretion was a yellowish watery fluid containing whitish flocculi. Smear preparations showed the presence of numerous gram negative motile bacilli of which a pure culture was obtained. A fortnight later the general condition of the animal was found to be much improved. The udder showed an indurated area about the size of a large apple. There was abundant secretion of yellowish watery fluid containing fine flocculi. Cultures were made from centrifuged deposit, but no growth occurred. The supernatant fluid showed a very slight agglutinating power for a suspension of the bacilli which were originally isolated from the udder. The blood serum was even less active in this respect. The ewe survived the attack.

Case No. 5.—This animal was examined within a few hours of the onset of illness. There was marked dullness, and injection of the mucous

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membranes. The right side of the udder was hot and swollen. The secretion was watery, and of a slightly yellowish tint. There were sores on both teats. Cultures from the secretion yielded a pure growth of staphylococcus albus. The ewe died three days later.

Case No. 6.—The ewe had been ill for seven days. The shepherd's description of the udder in the early stages was that it " went hard." The affected side showed marked induration, and the secretion was yellowish and watery, but did not contain flocculi. There was soreness of both teats. Cultures gave a pure growth of a streptococcus. The ewe died.

Case No. 7.—This animal had also been ill for seven days. The diseased half of the udder was indurated and secreted a foul-smelling yellowish brown fluid. Both teats were sore. Cultures gave a growth of a cocco-bacillus and staphylococcus albus. Recovery occurred slowly with induration and atrophy of the affected side.

Case No. 8.—This was a case of an animal which had recovered from a severe attack of the disease in one half of the udder during the previous season, and had now contracted the affection in the other half. The side originally attacked was atrophied and functionless. The other side was greatly enlarged, and very painful, and the teat was swollen and turgid. There was very marked swelling of the subcutaneous tissues anterior to the gland. The udder secretion which was of a port-wine colour and contained numerous flocculi, was quite free from any offensive odour. In smears made from centrifuged deposit a few leucocytes containing phagocyted cocci were seen. Many free cocci were also present. Cultures gave an abundant growth of staphylococcus albus, together with a few colonies of streptococcus. The ewe died after an illness of seven days.

Case No. 9.—The attack developed a month after lambing. When examined, the animal was acutely ill, with very depressed appearance and injected membranes. The right half of the udder was cold and doughy to the touch and showed blackening of the skin around the teat base. The secretion was a pinkish coloured fluid containing whitish flocculi. It was not offensive to the smell. Cultures showed a rich growth of staphylococci. A few colonies of streptococci were also present. The ewe died twelve hours later.

Case No. 10.—The shepherd noticed marked swelling of the udder of this animal about four weeks after lambing. This appeared to subside in a day or two and no other symptoms were observed until a week later, when an acute attack of mastitis set in. The appetite was completely lost, breathing was laboured, and rapid, and the temperature rose to 106.8° F. The left side of the udder was hot, tender and somewhat hardened, and yielded a secretion of the colour and consistence of

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thin custard. From the right half a small quantity of apparently normal milk was obtained. A pure culture of staphylococcus albus was obtained from the secretion of the affected half. A week later the general appearance had improved, but the udder was still tense and painful. Subsequently an abscess developed in the lower part of the gland and ruptured externally. It was still discharging two months later, but the condition of the animal was by then much improved. Tests were made to determine whether the blood serum and the whey obtained from the milk of the healthy side of the udder contained agglutinins for the staphylococcus responsible for the mastitis, but the results were negative. The ewe was afterwards " fattened off."

FIG. 1.—Udder. Normal Ewe. Magnification 70 ×.

Case No. 11.—Mastitis developed five weeks after lambing. The temperature quickly rose to 105.5° F. The left half of the udder was hot, painful and slightly hardened anteriorly. Its secretion was of a dark port-wine colour, but was not offensive in odour. Smears showed the presence of cocci and epithelial debris. Cultures yielded a pure growth of staphylococcus albus. The animal died after a fortnight's illness.

Case No. 12.—When examined seven hours after signs of illness were first noticed, the left side of the udder was hot and tense. Palpation revealed the presence of a circumscribed indurated area of the size of a tangerine. The secretion was blood tinged and contained a few strands of solid matter. Numerous cocci were present in smears. Cultures gave a growth of staphylococcus albus. A similar organism was isolated from a sample of blood taken from the jugular vein. The action of these two organisms on carbohydrates proved to be identical. The ewe died five days later and a *post-mortem* examination was made five hours after death. By this time decomposition of the carcass had already commenced. There was little or no œdema or extravasation of the subcutaneous tissue except that of the affected half of the udder. The consistence of the diseased gland was increased. The cut surface revealed marked congestion and showed small areas of softening, but

no large accummulation of pus. The mucous membrane of the galactophorous sinus was markedly injected. The other half of the udder appeared quite normal. The liver was extremely friable, the gall bladder greatly distended, and the contiguous liver surface brownish-black in colour. The cortices of both kidneys were reduced to a pulpy, almost semi-fluid mass. The lungs were congested and œdematous with areas of consolidation. Staphylococcus albus was isolated from the udder tissue, but not from the heart's blood or other organs of the body, although a variety of organisms were present in these situations probably as a result of *post-mortem* invasion. Sections of udder tissue showed acute congestion of the vessels and marked thickening of the interlobular septa due to the presence of a fibrinous exudate. Many of the acini were filled with catarrhal cells, their walls being almost completely denuded of epithelium. In others proliferation of the living cells was in evidence together with multiplication of fibroblasts of the adjacent connective tissue. The consolidated areas of the lung showed a croupous pneumonia. In the cortex of the kidney the cells of the glomeruli and convoluted tubules had completely lost their affinity for neuclear stains.

FIG. 2.—Mastitis. Natural infection with staphylococci. Organisms present in dark masses. Necrosis and desquamation of epithelium, leucocytic migration and commencing abscess formation. Congestion of blood vessels and widening of interlobular septa. Magnification 70 ×.

Case No. 13.—This ewe died after an illness lasting approximately thirty-six hours. A *post-mortem* examination was made immediately. Secretion obtained from the affected side was watery and of a bright red colour. On section the consistence of the diseased half was less firm than that of the normal. The cut surface was of a slaty-grey colour except for an area immediately posterior to the teat base where it was of a brownish yellow tint. It showed a number of purulent foci. The liver, kidneys and other organs of the body appeared normal. Cultures were made from the galactophorous sinus on each side, the material being obtained by inserting a sterilised pipette through the skin after searing the surface. From the affected side a streptococcus was isolated, but no growth was obtained from the other half. The

heart's blood also yielded a culture of a streptococcus which differed from the udder strain in its action on carbohydrates.

Histologically, numerous small abscesses were present in the affected tissue. There was marked congestion of the vessels throughout and in the part already described as having a brownish tint, many extravasated red cells were present. The interlobular septa were thickened due to infiltration of exudate and fibrin deposition. Leucocytes were abundantly present. The acini showed well-marked proliferation and desquamation of their lining cells as a result of which many of them were filled with masses composed of shed epithelium, leucocytes and clumps of cocci.

Case No. 14.—Material for examination was obtained from this animal within a few hours of symptoms of mastitis being evident. The temperature was 103.8° F. The right side of the udder was affected. On palpation an area around the base of the teat was tense and painful. As the lambs had recently suckled, only a small quantity of secretion was obtainable This had the appearance of a thin blood-stained fluid. Cultures gave a pure growth of staphylococcus albus. The animal died three days later.

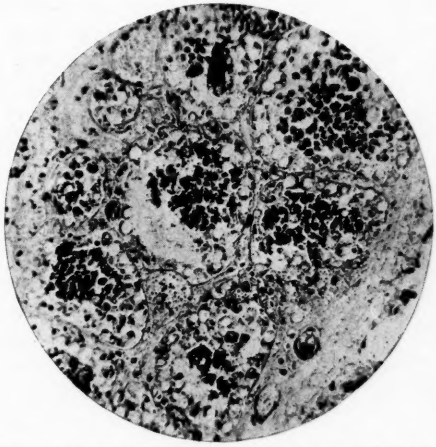

FIG. 3.—Mastitis. Natural infection with staphylococci. Organisms present in dark masses. Necrosis and desquamation of epithelium, leucocytic migration and commencing abscess formation. Congestion of blood vessels and widening of interlobular septa. Magnification 200 ×.

Case No. 15.—At the time this ewe was examined, the shepherd stated that she had shown signs of illness for not more than four hours. She was very dull in appearance, and was standing with the ears drooping and the back arched. Temperature was 105.4° F. The right side of the udder was rather more bulky and firmer to the touch than normal. The secretion was fairly copious and not much changed in appearance except that it contained a few flocculi. When centrifuged it gave an excessive amount of deposit in which numerous leucocytes were present. Cultures yielded a pure growth of staphylococcus albus. A week later, the ewe showed marked wasting, and the temperature was 103.8° F. There was no sign of abscess formation in the udder. The secretion was a thick glutinous yellow fluid. In addition to

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staphylococci various other organisms were present. The animal died a few days later.

Case No. 16.—The ewe was very dull in appearance, and showed marked disinclination to move. She had been ill for two days. The left side of the udder was somewhat enlarged and was hot, tense, and painful on palpation. The secretion was a straw-coloured fluid containing flocculi. The animal was destroyed and examined *post-mortem*. To the naked eye the appearance of the udder tissue was almost identical to that described in Case No. 12. The liver showed slight fatty changes. The capsules of the kidneys were adherent in parts and the cortical substance was a little less firm than normal. Other organs appeared healthy. Cultures were made from the udder, kidney, liver and heart's blood. From the two last named organs no growth was obtained, whereas both the udder and kidney gave a growth of staphylococcus albus. The organisms from these two sites were similar in their action on carbohydrates.

Histological examination of the affected udder tissue showed very acute congestion of the blood vessels, and the presence of multiple small abscesses varying in size up to 1 m.m. in diameter. Elsewhere many of the acini were filled with cellular exudate mainly composed of catarrhal cells and polyneuclear leucocytes. Clumps of cocci were abundantly present in this material. In other acini the changes were less marked though in most of them some degree of proliferation and desquamation of the epithelial cells was apparent. The interlobular septa were distended as a result of the presence of fibrinous exudate. The kidney showed a glomerulo-nephritis.

FIG. 4.—Mastitis. Experimental infection with staphylococci. Magnification 70 ×.

Case No. 17.—On the first day of illness the appetite was almost completely lost, the animal appeared very depressed and her temperature was 106° F. The left side of the udder was hot, painful and firm to the touch. The secretion was pale yellow in colour and contained numerous large whitish flocculi. It gave a growth of a gram negative bacillus.

The milk of the other half of the udder was sterile. The animal recovered.

Case No. 18.—An examination was made five days after the commencement of the attack, by which time some improvement in the animal's condition had taken place. The temperature was 103.8° F. The left side of the udder was firm and rather cold to the touch, and yielded a thin blood-stained secretion. In cultures the predominating organism was staphylococcus albus. Streptococci and coliform bacilli were also present. Blood drawn from the jugular vein gave a culture of staphylococcus albus. The animal recovered.

Case No. 19.—This was a very acute case with a sudden onset and rapidly fatal termination. The temperature at the sixth hour was 105.2° F. The animal was extremely dull in appearance and showed a marked disinclination to remain standing. On palpation the left side of the udder was cold and "doughy." The secretion yielded a pure culture of staphylococcus albus. Death occurred after eighteen hours.

FIG. 5.—Mastitis. Natural infection with streptococci. Organisms present in small dark masses. Well-marked congestion of blood vessels. Necrosis and desquamation of epithelium. Part of an abscess is seen on the edge of the figure. Magnification 70 ×.

Case No. 20.—The attack had been in progress for three days The animal was frothing at the mouth and grinding her teeth. The right half of the udder was enlarged, dark red in colour, and cold to the touch, especially around the base of the teat. Permission was obtained to destroy the animal for *post-mortem* examination. The carcass appeared to be well nourished. The subcutaneous tissue anterior to the udder was saturated with sero-sanguineous fluid. The udder tissue on section was less firm in consistence than normal and slate grey in colour except for the lower third which was brownish red. Several purulent foci were present in it. A watery port wine coloured exudate flowed from the cut surface. The other organs appeared normal. Staphylococcus albus was isolated from the udder tissue and the galactophorus sinus. From the heart blood and other organs of the body no growth was obtained. The histology of the udder tissue has already been described in the text. Sections of the subcutaneous

tissue in the neighbourhood of the gland showed acute congestion of the blood vessels with extravasation of red cells, aggregations of leucocytes surrounding clumps of cocci and proliferation of fibroblasts.

Case No. 21.—A ewe killed for experimental purposes apart from this investigation, showed evidence of mastitis affecting the right half of the udder. This was enlarged and yielded a copious secretion (about a litre) of a light yellow coloured fluid rich in flocculi. To the naked eye there was not much difference in the appearance of the udder tissue of the diseased and healthy sides. Cultures gave a growth of a gram negative bacillus from the right half, but no growth from the left. The histological changes were those of a very early stage of mastitis. There was slight congestion of the blood vessels and moderate leucocytic infiltration. Some of the acini contained a few catarrhal cells.

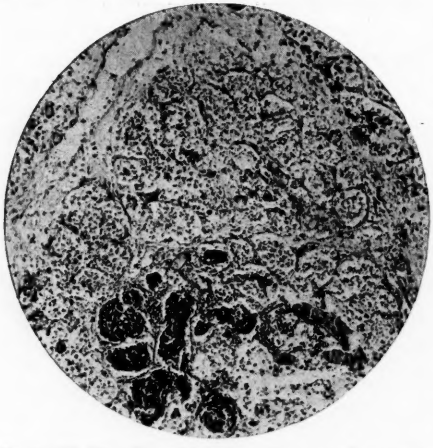

FIG. 6.—Mastitis. Natural infection with pasteurella organism. Catarrhal changes well-marked. Some of the acini contain a fibrinous exudate. Magnification 70 ×.

Case No. 22.—A ewe belonging to the flock of the Department of Animal Pathology showed slight enlargement and induration of the left side of the udder. The secretion which was thick and creamy, yielded a culture of a motile gram negative bacillus. The affected part gradually became atrophied.

Case No. 23.—This animal, which was killed for experimental purposes apart from this investigation, showed an appreciable enlargement of one half of the udder. Otherwise the gland appeared to be quite normal to the naked eye. Cultures from the swollen side gave a growth of staphylococcus albus. Those from the other side were negative. Histological examination showed early catarrhal changes of the affected part.

Case No. 24.—This ewe was examined six hours after signs of illness were first noticed. The right side of the udder was affected and showed the usual symptoms. The milk was unchanged in colour, but contained a few small flocculi. On centrifuging, a large amount of deposit very rich in cocci was obtained. Cultures gave an abundant growth of staphylococcus albus. The ewe died three days later, and when

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examined *post-mortem* her udder showed the typical appearance of "black garget." The histological changes were similar to those noted in other cases of staphylococcic infection (see text).

Case No. 25.—In the early stages of the disease the right side of the udder was found to be swollen and painful, darkish brown in colour, and somewhat cold in the lower third. There was ulceration of both teats accompanied by scab formation. The temperature was 104.8° F. Secretion from the affected part was abundant. It was a light brown watery fluid, acid in reaction and containing flocculi. The secretion contained such large numbers of organisms that it was impossible to count the colonies developing on agar plates inoculated with .002 c.c. The growth consisted of a mixture of streptococci and staphylococci. The ewe died three weeks later as a result of the onset of gangrene. At the time of death partial sloughing of the dead tissue had occurred.

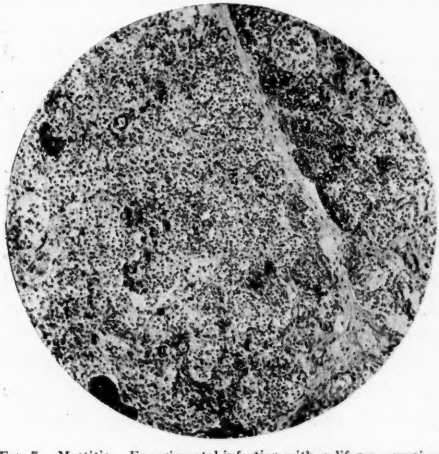

FIG. 7.—Mastitis. Experimental infection with coliform organism. General proliferation and desquamation of epithelial cells. Evidence of commencing fibroblastic multiplication. Magnification 70 ×.

Case No. 26.—At the time the examination was made the animal had been ill for eight hours. She showed great prostration and had a temperature of 104° F. The left side of the udder was enlarged and firm to the touch, but did not seem very hot or painful. The secretion was yellowish and watery. Smears showed the presence of cocci. In cultures the growth was mainly that of staphylococcus albus. Streptococci were also present. Several doses of autogenous vaccine were given, but the ewe died a fortnight later.

Case No. 27.—A ewe belonging to the flock of the Department of Animal Pathology was killed for experimental purposes. The history of the animal which was suckling twin lambs showed that on the previous day the secretion from the left teat was seen to be blood stained, and four days earlier that from the right teat had appeared thick and purulent. On section the right half of the udder was a little firmer in consistence than normal. The galactophorous sinus contained a quantity of thick creamy material. The contents of the sinus of the left side appeared to be normal. The udder tissue itself showed no

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appreciable alteration. No organisms could be detected in smears made from the contents of the two sinuses, but in cultures a sparse growth of staphylococcus albus was obtained from each.

Histologically, the udder tissue showed no abnormality.

Case No. 28.—This ewe died of mastitis after an illness of three days. On *post-mortem* examination the changes in the udder tissue were confined to the right half of the gland. The overlying skin was discoloured, and on section a blood-stained serous fluid exuded from the cut surface. The gland tissue showed very distinct lobulation and varied in colour from reddish to grey. In the galactophorous sinus there was a quantity of yellowish fluid containing many flocculi. A number of cultures were made, all of which yielded a pure growth of a gram negative bacillus that showed a tendency to stain deeply at the poles. Histologically, the udder showed marked distension of the blood vessels, and widening of the interlobular septa as a result of the presence of fibrin deposit. The alveoli showed acute catarrhal changes, but little or no evidence of necrosis. The causal organisms were scattered throughout the affected tissue in some parts of which they were present in large clumps.

Case No. 29.—A sample of milk was received from a case of mastitis of twelve hours standing which occurred in the same flock as Case 28. The milk was watery and contained a few floccules. Smears showed the presence of a gram negative bipolar organism similar in appearance to that obtained from the previous case. The ewe died two days later, and her udder was removed and forwarded to the laboratory. The left side only was affected. On section, it was firmer in consistence than normal. The cut surface was greyish brown in colour, and beset with small hæmorrhages. A pure growth of the bipolar organism was recovered in cultures. The histological changes in the udder tissue were similar to those described in the previous case, except that the catarrhal changes were even more advanced.

Case No. 30.—A further case in the same flock. A sample of milk was taken and forwarded to the laboratory within a few hours of the commencement of illness. It was a yellowish watery fluid containing numerous flocculi. Cultures yielded a pure growth of a bipolar organism. The animal recovered.

Case No. 31.—This case occurred in Northumberland. A sample of udder secretion was taken and examined on the third day of illness. The material was straw-coloured and watery. Large numbers of cocci were present in it. Cultures gave a pure growth of staphylococcus albus. The animal died a week later, but it was not possible to make a *post-mortem* examination.

Case No. 32.—A sample of udder secretion was received from a case

of mastitis of more than three weeks standing. The material was very thick, slate grey in colour, and had an offensive smell. Smears showed the presence of large numbers of diphtheroid organisms together with a few cocci. A mixed culture of diphtheroid and staphylococcus albus was obtained. It was later reported that the ewe had recovered.

Case No 33.—This was a case of mastitis involving both sides of the udder. The second half showed inflammatory symptoms about twenty hours after the first. The udder was cold to the touch and had a livid appearance. It showed a number of yellowish patches which looked like areas of necrosis. No secretion could be obtained from the right teat, but from the left a thin hæmorrhagic fluid was withdrawn. Smears from this showed the presence of groups of cocci. A pure culture of staphylococcus albus was obtained. A sample of blood removed from the jugular vein proved to be sterile. The animal recovered from the attack.

Case No. 34.—This animal had been affected with mastitis in one half of the udder for about a month. The remaining half appeared healthy. From the affected part a thick creamy secretion was obtained. It was greenish yellow in colour and had an offensive smell. A cultural examination resulted in the isolation of a diphtheroid bacillus, together with staphylococcus albus, the former being the more abundant. The animal survived the attack.

Case No. 35.—This was an old standing case of seven weeks duration affecting the right side of the udder. The secretion took the form of a light brown watery fluid containing whitish flocculi. A diphtheroid bacillus was recovered in pure culture. The animal recovered.

Case No. 36.—This was another old standing case of about the same duration as the previous one. Sores were present on both teats. The appearance of the milk at this stage was practically normal. A number of cultures were made but no growth resulted.

Case No. 37.—The animal had been ill for about six hours. The left side of the udder was hot, tense and painful. A healing sore was present at the base of the teat. The secretion was a serous hæmorrhagic odourless fluid. The animal was destroyed on the following day when *in extremis*. *Post-mortem* examination revealed the presence of a serous infiltration of the subcutaneous tissue adjoining the anterior part of the gland. The udder tissue, on section, had the typical appearance of a case of " black garget." There were no marked changes in any of the other organs. Cultures from the udder and heart's blood yielded a pure growth of staphylococcus albus. The histological changes seen in the udder tissue have already been described in the text.

Case No. 38.—On examining this animal a few hours after the onset of mastitis the left side of the udder was found to be hot, painful and

slightly hardened. A thin whitish secretion containing strands of fibrinous material was withdrawn from the teat. The animal's temperature was 105.2° F. A pure culture of a bipolar organism was obtained from the secretion. This was the third case of mastitis to occur in this flock during the 1928 season and it proved fatal a few days later. The other two cases, which we had no opportunity to examine, were stated to have recovered. The bipolar organism was similar to that isolated from three cases in the same flock during the previous season.

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Correction: Table II *should read:*

C 1925 Number of Cases 2 Staphylococci 1 Coliform 1

Translations

Contribution to the Study of the Etiology of Milk Fever.

By Dr. E. AME,
Veterinary Surgeon at Obernai.

Revue Générale de Méd Vétérinaire, Feb. 15, 1929.

WE think it would be useful to cast aside this misleading name, by which we wish to describe an asthenic or comatose state following calving which occurs in dairy cattle. Everybody knows the more or less marked phenomena which characterise puerperal coma. On the other hand the many explanations which the classics as well as the authors of original works have given of this accident show that the

question of its etiology and pathogeny still remain obscure and debatable. We have no pretension to decide the question which remains open ; but we do intend to contribute very modestly to the study of a very interesting question. We wish to advance directly that we are disposed to plead in favour of a plurality of causes of a syndrome which in our opinion may be provoked by pathological states of different nature. The quick occurrence, the disturbing progress (accompanied by fall of temperature), the rapid recovery without convalescence, all denote " a sudden rupture of humoral equilibrium," and calls to mind anaphylactic shock, flocculation (*Lumiere*), such as occurs in autosensibilised subjects.

On the other hand one sees the resemblance of the syndrome to insulinemic shock such as one observes in the diabetic man following an exaggerated insulin injection. We have had the idea for several years of treating " milk fever " exactly as one treats, with success, the diabetic affected with an insulinemic shock, that is to say by an intravenous injection of glucose. In a series of cases of calving coma we have injected 100 to 200 grammes of glucose—and, in fact we have been surprised to find in several consecutive cases, a cure as prompt as one has a right to expect from mammary insufflation, with this advantage, that the lacteal secretion suffers no decrease. We explain the phenomenon as follows :—The lacteal secretion, suddenly brought about at the time of parturition, releases a glycogenic discharge of the liver. Then the liver, an antagonistic organ of the pancreas in insulin-glycogenic metabolism, was rested during gestation : held in equilibrium and unstable with the pancreas, this equilibrium is suddenly upset by the glycogenic discharge. It is broken to the profit of the pancreas and to the detriment of the fatigued liver. The result will be an insulinemic shock.

Thus encouraged by magnificent results we believed we held the key of the enigma when one fine day in a typical case the new " miraculous cure " is shown to be without effect and we are obliged to resort to the old classic method of mammary insufflation. Since we have had experience that the glucosed injection is ineffective in scarcely a majority of cases.

For this cause we have given it up about a year.

It still appeared to us to be interesting to see if the preventive treatment by the injection of glucose immediately after parturition, is effective or not. The experience gained causes us to answer in the negative. Recently a cow affected with " milk-fever " last year, and which could only be saved by insufflation, calved again naturally. During several weeks before the term she had received a daily dose of 100 grammes of sugar. A few hours after calving we injected 100

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grammes of glucose and 10 grammes of adrenalin. Fourteen hours after the injection she fell into a profound and very grave coma, which necessitated two energetic insufflations (the second six hours after the first) and some hypodermic injections of veratrine and caffeine.

From these facts it appears that there are at least two different determining causes of vitulary coma ; in a part of the cases the shock appears to depend on a hypoglycæmia, but in the majority of cases causes of another nature must be impeached.

Abstract

On a Piroplasmosis-like Disease of Cattle in Sapporo and its Neighbourhood.*

By CHIUSI KOHANAWA and KISAJIRO OGURA,
Veterinary Institute, Hokkardo Imperial University, Sapporo.

In Sapporo and its neighbourhood, especially in the Makomanai Livestock Breeding Farm, there has been a piroplasmosis-like disease of cattle, so-called " tick fever," which chiefly attacks pastured cattle and its damage is not small. As recently its damage has gradually become larger and larger, it is now a matter of importance scientifically and practically to investigate the cause and nature of the disease. We have engaged in the investigation of the disease for several years and have already examined about 90 diseased cattle in order to know the character of the illness. We obtained the following results from blood examination, *post-mortem* results, inoculation experiments and trypanblue (Cassella) injection. But our investigation will continue since it has not come to a satisfactory conclusion.

1.—The so-called " tick fever," which is an epidemic disease among the cattle in Sapporo and its neighbourhood, occurring in summer, is analogous in type to piroplasmosis.

2.—The main symptoms consist of fever, anæmia, icterus, hæmoglobinuria and abnormal erythrocytes pathologically changed ; but it is very seldom that a case has all fine symptoms. Even in cases in which both fever and anæmia are very slight and the other symptoms are absent, there are always abnormal erythrocytes in the blood. For this reason we think that the abnormal erythrocytes are the most important factors in the diagnosis of this disease.

* Abstract from *The Journal of the Japanese Society of Veterinary Science*, Vol. IV, No. 3.

3.—It is not possible now to determine to what kind of piroplasmosis this disease belongs; but it coincides with neither Texas-fever nor coast fever. The disease resembles the former in symptoms, but the piroplasma in the blood of the diseased animals are quite different in form; and the disease differs from coast fever in symptoms, but the parasitic piroplasma morphologically resembles each other very nearly.

4.—This disease is analogous to piroplasmosis, but the piroplasma proved in the blood cells cannot be decided with certainty as the excitants of the disease. For the presence of piroplasma in the blood does not always denote that the animal is infected. We have often found that healthy cattle have rather more parasites in the blood than the diseased animals. As is proved by the inoculation experiments with the blood of infected cattle into healthy ones, the transmission of piroplasma and invasion of the disease does not go hand in hand.

5.—With respect to the therapeutic value of trypanblue (Cassella), we cannot express an opinion, for we used too few animals for this purpose. But according to our experiments the trypanblue is not good for this disease, being rather harmful to the infected animals.

News

It was agreed that from August 1st assistant veterinary officers of the Surrey County Council be paid at the rate of £400 per annum, rising by annual increments of £20 to £500, the present scale being £350 to £500. It was stated that the former scale did not attract applications.

Royal Veterinary College.

At the annual general meeting held recently, Lt.-Col. Sir Merrik R. Burrell, Bart., C.B.E., Floodgates, West Grinstead, Horsham, Sussex, was elected Chairman of the Board of Governors in succession to the late Lord Northbrook. Viscount Lascelles, Lord Daresbury, Lt.-Col. Sir Merrik R. Burrell, Bart., Sir Walter Gilbey, Bart., and Lt.-Col. Sir Archibald Weigall were elected Vice-Presidents of the College.

Second National Dog Week.

The Second National Dog Week, organised by the National Dog Week Council, under the presidency of Lord Chesterfield, is to be held from September 22nd to 28th.

Apart from its educational and propagandist aims, the Second National Dog Week has for its object the raising of the final £10,000 for the Royal Veterinary College Canine Diseases Appeal Fund (the rebuilding of the dilapidated Canine Section of the Royal Veterinary College, which will enable them to cope with the immense amount of work done for the suffering animals of the poor, and the endowment of a Chair of Professorship in Canine Medicine and Surgery).

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As a result of the last National Dog Week the first £10,000 was raised, and as soon as the minimum of £20,000 has been reached through this year's effort the most needed thing in dogdom to-day will have been put on a working basis—a specialised inquiry into the many obscure dog diseases which are yearly taking an increasing toll of British dogs, and a consequent minimising of canine suffering and mortality.

Our readers can render the National Dog Week Council the greatest possible assistance. They can organise local effort in their own towns, or merely assist in the immense amount of propaganda work required throughout the country. The National Dog Week Council, of 37-8, Temple Chambers, Temple Avenue, London, E.C.4, will be only too pleased to give the fullest possible particulars of what they require their voluntary workers to do. Offers of assistance should be sent to the above address.

The Veterinary Profession in Spain.

THE four Veterinary Schools of Spain are situate in Madrid, Leon, Zaragoza (Saragosa) and Cordoba. Each of these Schools has a teaching staff of 8 Professors and 5 Assistants, the course is a five years' course, and the number of students is approximately 280 in Madrid, 230 in Leon, 250 in Zaragoza, and 190 in Cordoba.

There are 5,000 Veterinary Surgeons in Spain ; 90 of these are Public Health Inspectors, whose salaries are paid by the State ; 350 are Veterinary Surgeons in the Army ; the rest are called " Veterinarios Municipales " and work in the towns and villages.

Personal

COLONEL GLASSE has resigned the post of States' Veterinary Officer to the Government of Guernsey and Major P. D. Carey has been appointed in his stead.

DR. THOMAS W. M. CAMERON, B.Sc., Ph.D., M.R.C.V.S., Lecturer in the London School of Hygiene and Tropical Medicine, has been appointed Lecturer in Helminthology in the Department of Zoology of the University of Edinburgh and the Royal (Dick) Veterinary College.

COLONEL W. S. ANTHONY, C.M.G., has been selected for the appointment of Director-General, Army Veterinary Services, with the rank of Major-General, to date from December 1, 1929, in succession to Major-General H. T. Sawyer, C.B., D.S.O.

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